THE TECHNOLOGY BEHIND THE ION SCIENCE TIGER XT

Photoionisation Detector (PID)

PID is the abbreviation for "Photo-Ionisation Detector". A PID is a hand-held, personal, or fixed wall-mounted detector that measures a broad range of volatile organic compounds (VOCs) and some inorganic compounds in the parts-per-million (ppm) to parts-per-billion (ppb) range. It gives a continuous read-out and can alarm when concentrations exceed user-defined set-points. It can also log data, calculate Time-Weighted Average (TWA) and Short-Term Exposure Limit (STEL), and alarm above these hygiene values.

What PID is used in the ION Science Tiger XT?

The ION Science Tiger XT incorporates their own PID sensor, known as the MiniPID 2. This sensor consists of a high energy output, ultraviolet lamp and three electrodes. MiniPID 2 has been independently verified as best performing on the market for speed, accuracy, resistance to humidity and contamination.

What makes the MiniPID 2 sensor different to other PID sensors?

Standard photoionisation sensors do have issues, if the sensor chamber becomes contaminated with airborne dirt, ambient humidity can be absorbed by the contamination, creating a conductive path between the electrodes. This conductive path creates an artificial signal that varies with humidity. Airborne dirt can also coat the lamp window which over time, reduces sensitivity. To combat these effects of contamination, ION Science have a unique patented fence electrode and an anti-contamination system. The anti-contamination system consists of a fine, PTFE membrane that covers the entrance of the sensor chamber. It not only blocks the path to larger particulates, but it also retains ozone, that is naturally generated in the sensor chamber. Ozone cleans the sensor chamber and lamp window, helping the sensor to maintain optimum performance. Even the ION Science sensor chamber may become contaminated, the ION Science fence electrode blocks the path between the two main electrodes. This practically eliminates the effects of humidity. All ION Science PID sensors have a fence electrode and an anti-contamination system.

Tiger XT Response Factors

The response factor (RF) relates the sensitivity of PID to a particular compound against the sensitivity to the standard calibration gas isobutylene. The RF is inversely proportional, so the lower the RF, the higher the sensitivity, and vice versa.

Ideally, the PID response to a compound would be calibrated using similar conditions to the end application. For example, calibrating the PID to the compound in the concentration range of interest. However, this is often not practical. Due to its safety, cost, and availability, Isobutylene is often used to calibrate PID, and a RF used to convert the isobutylene calibrated measurement to a measurement of the target volatile:

Concentration of target chemical = isobutylene calibrated measurement x RF

For example, the RF of anisole is 0.59 with a 10.6 eV lamp. That means 0.59 ppm anisole delivers the same PID response as 1 ppm isobutylene. A 10 ppm response to anisole, from an isobutylene-calibrated unit would indicate:

Concentration of anisole = 10 ppm x 0.59 = 5.9 ppm

ION Science are continually running research and development programs into PID. As such, the RFs of many chemicals have been measured against different PID variants, and lamps of various photon energy and intensity.

When calibrating, for the greatest accuracy, ION Science recommends calibrating against the target gas at the concentration of desired measurement. However, where this is not practical, over 1000 RFs are available in technical article 'TA-02'.

Download here: https://ionscience.com/en/gas-and-leak-detectors/customer-support/support-documents/technical-application-articles/

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